Upper Lower Miocene Aggradational (LM4 A1) Play

***Marginulina ascensionensis* and *Discorbis bolivarensis* biozones**

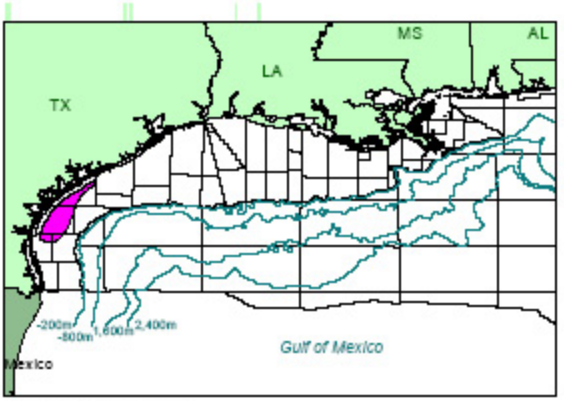

Figure 1. Play location.

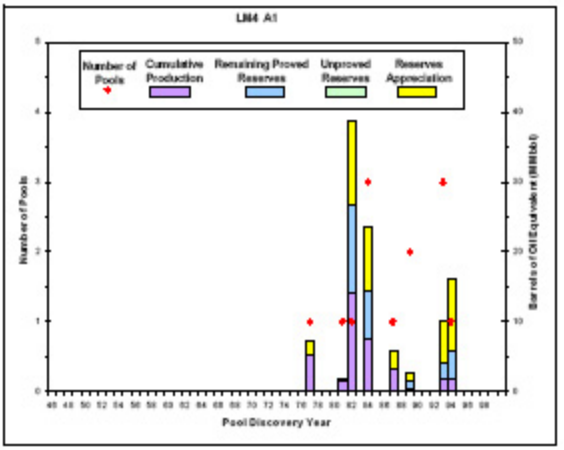

Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

LM4 A1 Play 13 Pools 41 Sands	Minimum	Mean	Maximum
Water depth (feet)	78	141	212
Subsea depth (feet)	6294	7915	11949
Number of sands per pool	1	3	11
Porosity	21%	26%	30%
Water saturation	16%	31%	40%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Upper Lower Miocene Aggradational (LM4 A1) play occurs within the *Marginulina ascensionensis* and *Discorbis bolivarensis* biozones. This play extends from the North Padre Island Area to the Matagorda Island Area offshore Texas (figure 1).

Updip, the play continues onshore into Texas. To the east, west, and downdip, the play grades into the deposits of the Upper Lower Miocene Progradational (LM4 P1) play.

Play Characteristics

The LM4 A1 play is characterized by stacked sands that were deposited in channel/levee complexes, crevasse splays, distributary mouth bars, delta-fringes, and shelf environments. These sands are typically coarse-grained and exhibit a blocky log signature. The LM4 A1 play comprises a significant portion of the LM4 section in terms of net sand development, reaching a thickness of approximately 1,500 feet.

Most of the fields in the LM4 A1 play are structurally associated with normal faults and growth fault anticlines. Less common trapping structures include diapir-like shale bodies with traps located on the flanks of the shale, or in sediment drape over the shale. Seals are provided by the juxtaposition of reservoir sands with shales, either structurally (e.g., faulting) or stratigraphically (e.g., lateral shale-outs, overlying shales).

Discoveries

The LM4 A1 gas play contains total reserves of 0.002 Bbo and 0.587 Tcfg (0.106 BBOE), of which 0.001 Bbo and 0.196 Tcfg (0.035 BBOE) have been produced. The play contains 41 producible sands in

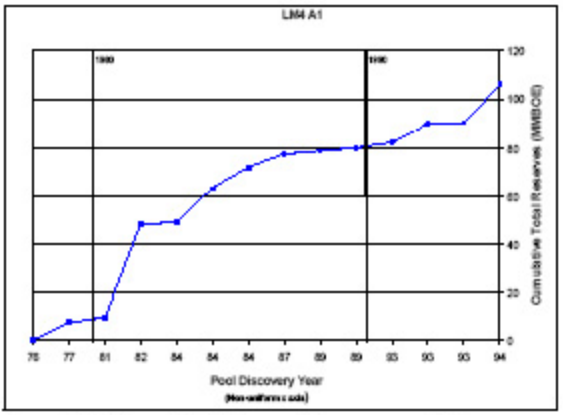

Figure 3. Plot of pools showing cumulative reserves by discovery order. Note the non-uniform x axis.

LM4 A1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	13	0.001	0.345	0.062
Cumulative production	–	0.001	0.196	0.035
Remaining proved	–	0.001	0.149	0.027
Unproved	0	0.000	0.000	0.000
Appreciation (P & U)	–	0.001	0.242	0.044
Undiscovered Conventionally Recoverable Resources				
95th percentile	–	<0.001	0.124	0.023
Mean	8	0.001	0.161	0.029
5th percentile	–	0.001	0.199	0.036
Total Endowment				
95th percentile	–	0.002	0.711	0.129
Mean	21	0.003	0.748	0.135
5th percentile	–	0.003	0.786	0.142

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

13 pools (table 1; refer to the Methodology section for a discussion of reservoirs, sands, and pools). The first reserves in the play were discovered in the Mustang Island 757 field in 1977 (figure 2). Maximum yearly total reserves were added in 1982 with the discovery of the largest pool in the play, the Mustang Island 31A with 39 MMBOE in mean total reserves (figures 2 and 3). Ninety percent of the play's cumulative production and 75 percent of the play's total reserves come from pools discovered before 1990. The most recent discovery, prior to this study's cutoff date of January 1, 1999, was in 1994.

The 13 discovered pools contain 50 reservoirs, all of which are nonassociated gas.

Assessment Results

The marginal probability of hydrocarbons for the LM4 A1 play is 1.00. The play has a mean total endowment of 0.003 Bbo and 0.748 Tcfg (0.135 BBOE) (table 2). Twenty-six percent of this BOE mean total endowment has been produced.

Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of <0.001 to 0.001 Bbo and 0.124 to 0.199 Tcfg at the 95th and 5th percentiles, respectively (figure 4). Mean UCRR are estimated at 0.001 Bbo and 0.161 Tcfg (0.029 BBOE). These undiscovered resources might occur in as many as eight pools. The largest undiscovered pool, with a mean size of 7 MMBOE, is forecast as the sixth largest pool in the play (figure 5). The next four largest pools occupy positions 9, 10, 11 and 12 on the pool rank plot. For all the undiscovered pools in the LM4 A1 play, the mean mean size is 4 MMBOE compared to the 8 MMBOE mean size of the discovered pools. The mean mean size for all pools, including both discovered and undiscovered, is 6 MMBOE.

BOE mean UCRR contribute 21 percent to the play's BOE mean total endowment. Hydrocarbons have been discovered to date only in the

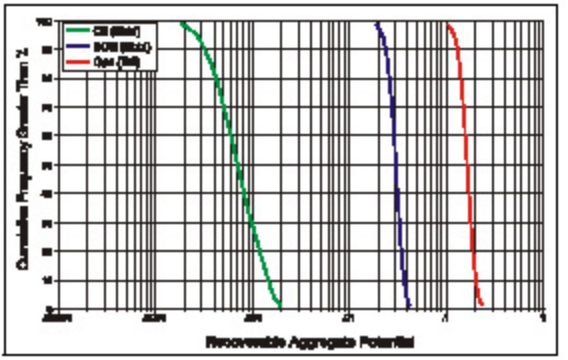

Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

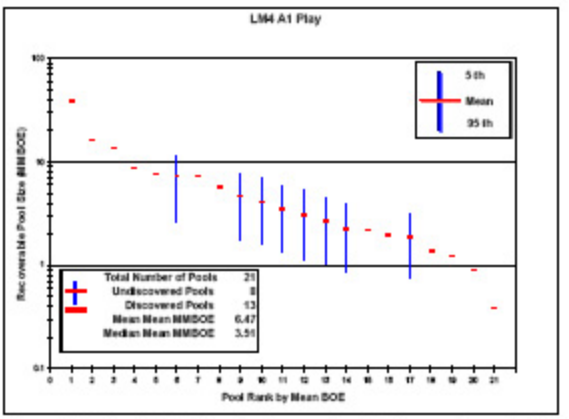

Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

Matagorda Island and Mustang Island Areas of the play.